Air Quality in Prince George's County during the COVID-19 Pandemic

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Project Goals

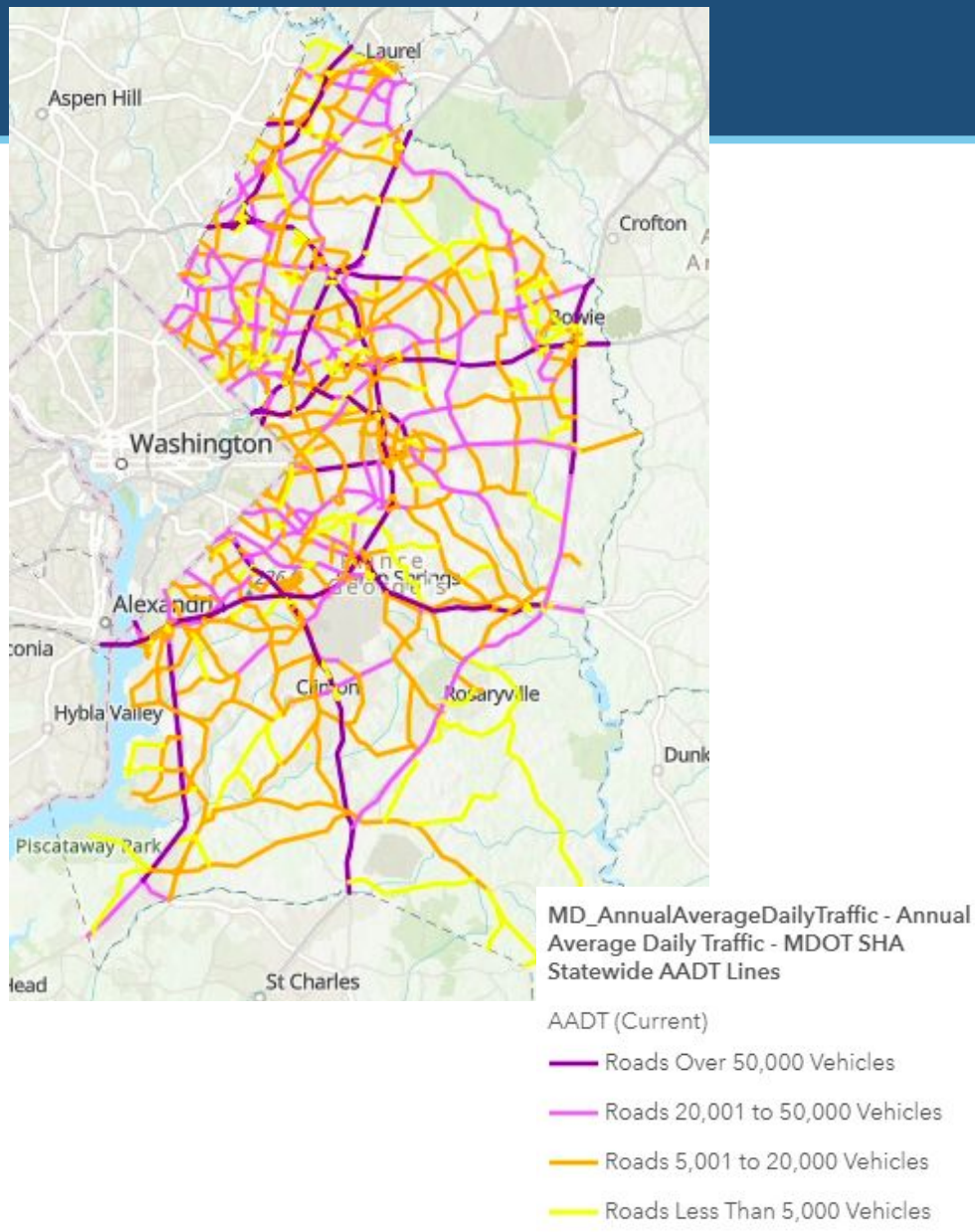
1. Examine air quality during the pandemic as compared to past years and relate to traffic
2. Understand air quality differences throughout Prince George's County
3. Identify emissions sources and their impacts on Equity Emphasis Areas
4. Discuss health implications of air quality, especially related to Equity Emphasis Areas
5. Describe potential policies to improve air quality and mitigate health impacts of poor air quality

Mobile Emissions

SHA traffic data for Prince George's County, for 2019 and 2020

Traffic count locations:

- I-95: 1.02 miles south of MD 214
- I-95: .05-mile north of Good Luck Road
- MD 4: .54-mile north of Patuxent River Bridge
- US 50: .75-mile west of MD 202



Mobile Emissions: Legal Context

Federal

- EPA standards for fuel economy and emissions
- preempt state and local standards

Maryland

- Clean Cars Program
  - joins California, other states
  - further reduce emissions beyond federal rate
    - volatile organic compound (VOC) emission rate is 3.4 tons/day less than federal rate
    - nitrous oxide emission rate is 2.9 tons/day less than federal rate
    - (both contribute to ground-level ozone)

Clean Commute

- public transportation
- tax credit

Legal Context: Stationary Emissions

- Clean Air Act
  - Title V
  - Permit 70
  - Minimum threshold 100 tons/year
- Permits include measuring and reducing pollution
- Maryland Regulations
- Prince George's County: 9 stationary sources

https://mde.maryland.gov/programs/Permits/AirManagementPermits/Pages/title5factsheet.aspx

Reference	Pollutants	Potential Emissions	Fugitives Included?	Locations
Sec. 302 of the Clean Air Act	Any air pollutant	100 tons per year	Depends*	Entire State
Part D of Title I of the Clean Air Act	Nitrogen Oxides	25 tons per year	No	Baltimore City, Anne Arundel, Baltimore, Carroll, Cecil, Harford, Howard, Calvert, Charles, Frederick, Montgomery, Prince George's
	Volatile Organic Compounds	25 tons per year	No	Baltimore City, Anne Arundel, Baltimore, Carroll, Cecil, Harford, Howard, Calvert, Charles, Frederick, Montgomery, Prince George's
		50 tons per year	No	Allegany, Caroline, Dorchester, Garrett, Kent, Queen Anne's, St. Mary's, Somerset, Talbot, Washington, Wicomico, Worcester
Sec. 112 of the Clean Air Act	Hazardous Air Pollutants which have been listed pursuant to Sec. 112(b) of the Clean Air Act	10 tons per year of any single HAP; or 25 tons per year of any combination of HAPs	Yes	Entire State

Methods: Air Quality Analysis

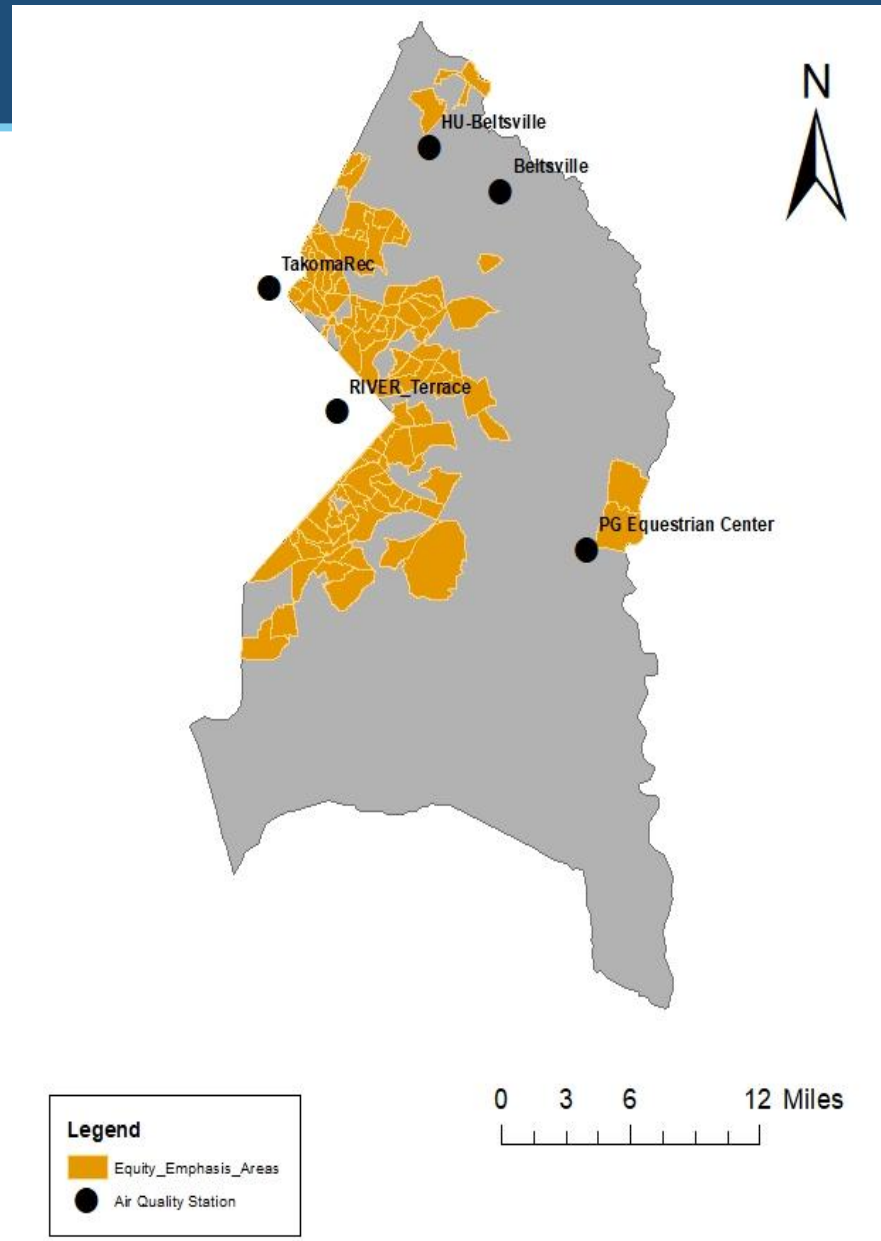
Pollutants:

Ozone, NO2, PM2.5, PM10

Air quality monitoring stations:

1. HU-Beltsville
2. Beltsville
3. Prince George's Equestrian
4. Takoma Recreation Center
5. River Terrace

12-mile impact zones



Station Name	Ozone	PM 2.5	PM 10	NO2
HU-Beltsville	X	X	X*	X*
Beltsville	X			
Prince George's Equestrian	X			
Takoma Recreation	X			X*
River Terrace	X	X		X*

*reported through June 30

Methods: Air Quality Analysis

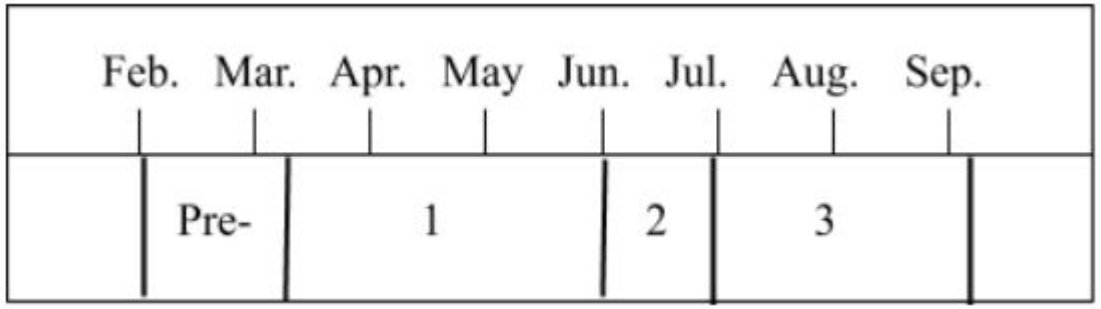
Periods based on lockdown stages:

Pre-pandemic: Feb 5 – Mar 5

Period 1: Mar 6 – May 31

Period 2: Jun 1 – Jun 28

Period 3: Jun 29 – Sept 5



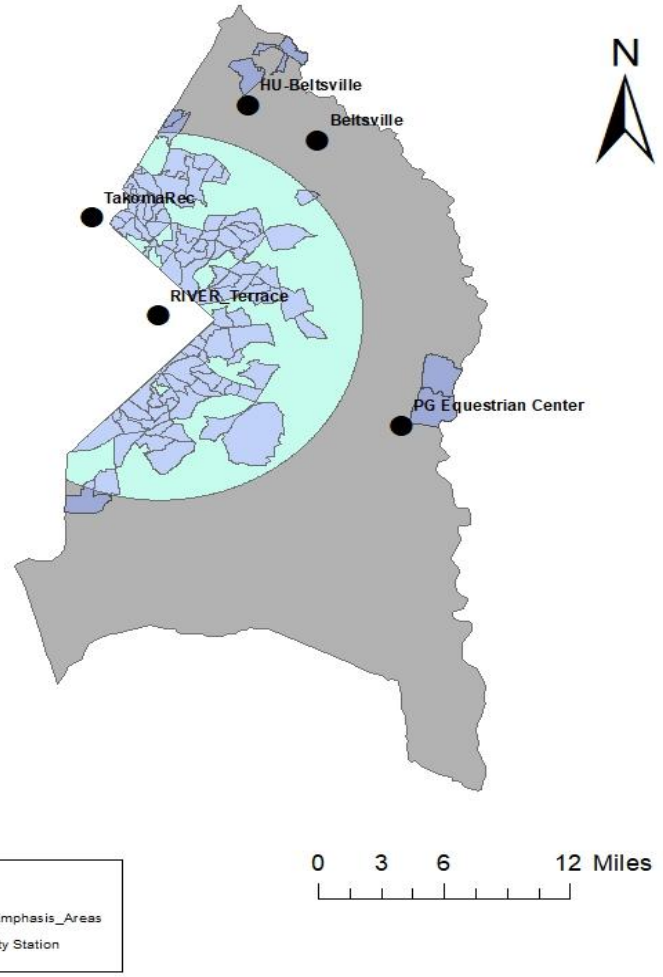
2020 stages compared to same time periods in 2017-2019

Methods: Comparison Between Stations

River Terrace: 87% of
Equity Emphasis Areas

Compared all stations against
River Terrace

Equity Emphasis Areas: census tracts with higher than average concentration of low-income, minority populations, or both



Methods: Equity Emphasis Areas

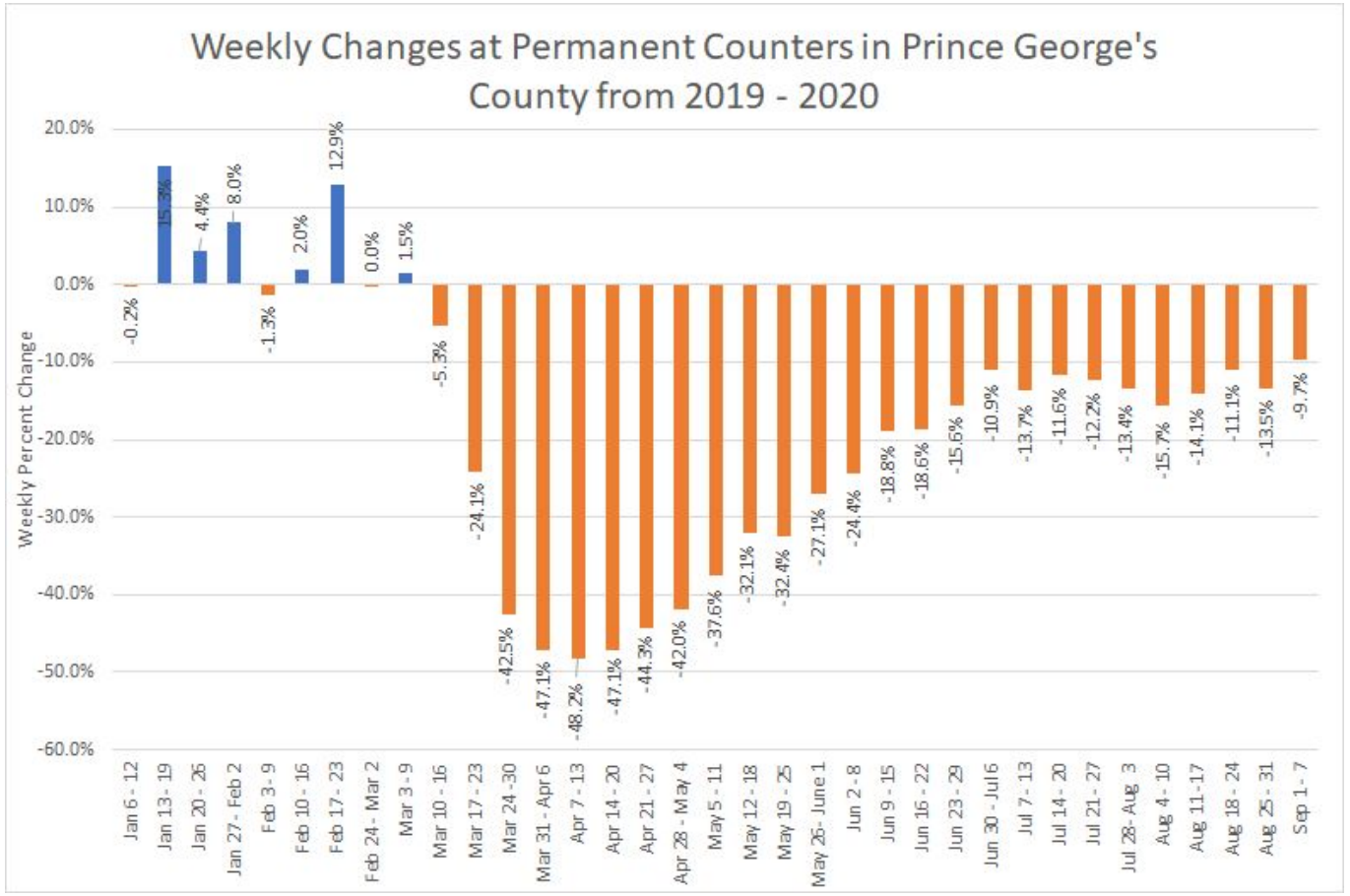
ArcMap 10.8 identified County census tracts considered Equity Emphasis Areas

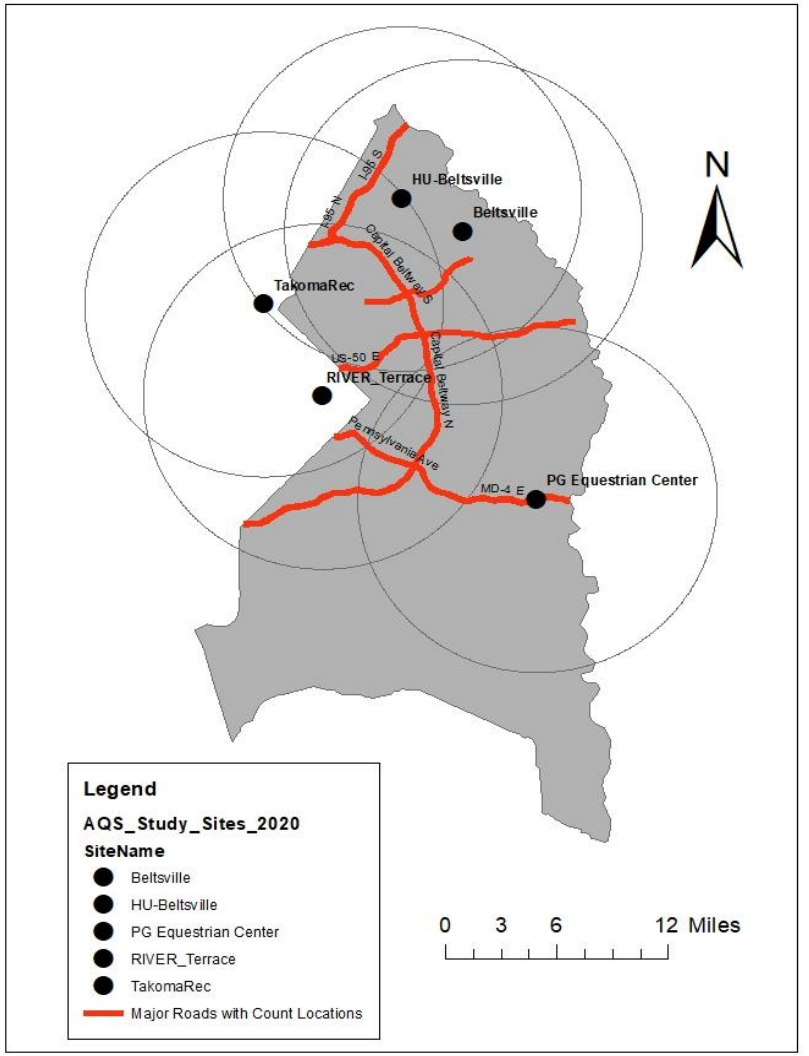
Jenks Natural breaks classification method used to show Equity Emphasis Areas with higher index scores in each Air Quality Station impact area

Four tiers correlated with different rankings for the Total Index Scores for Equity Emphasis Areas

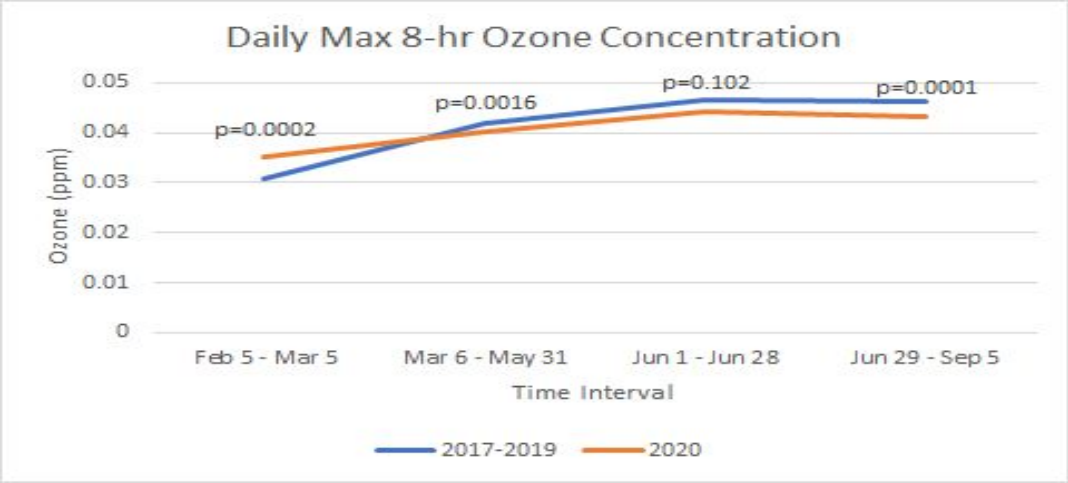
Tier based on Jenks Natural Break	Rank	EEA Index
1	Low	4-4.9
2	Moderate	5-6.5
3	High	6.6-9.6
4	Very High	9.7-12

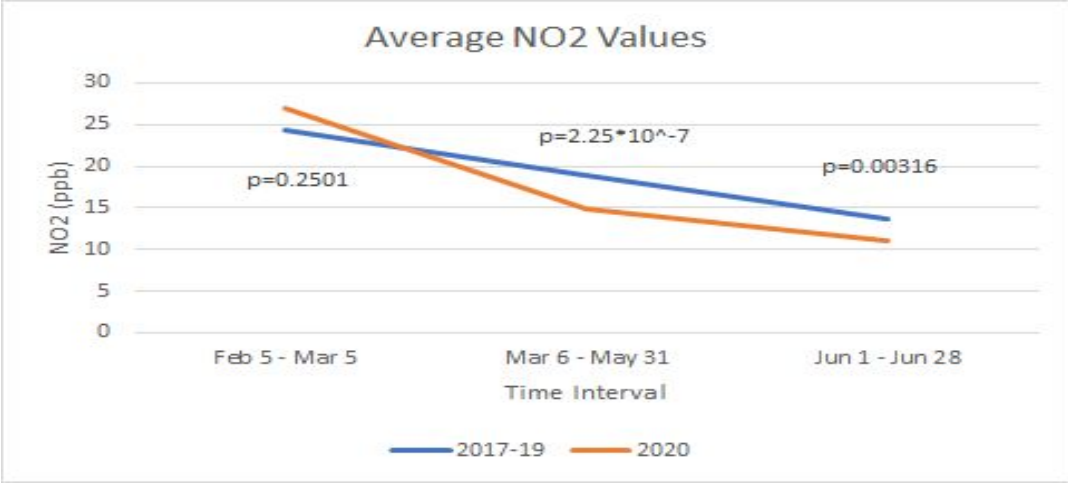
Traffic volume decreased beginning in Pandemic Period 1.
The largest difference was during the of week April 7-13.

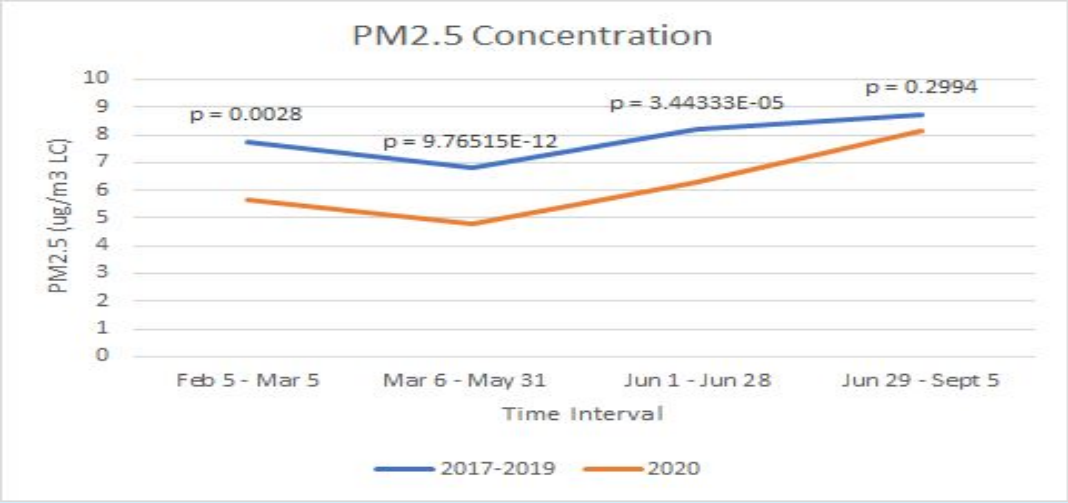


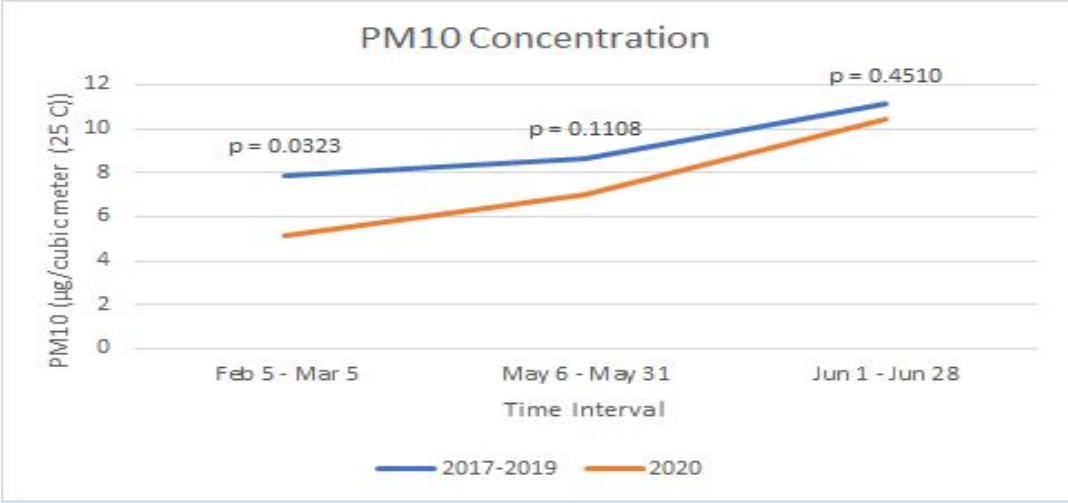


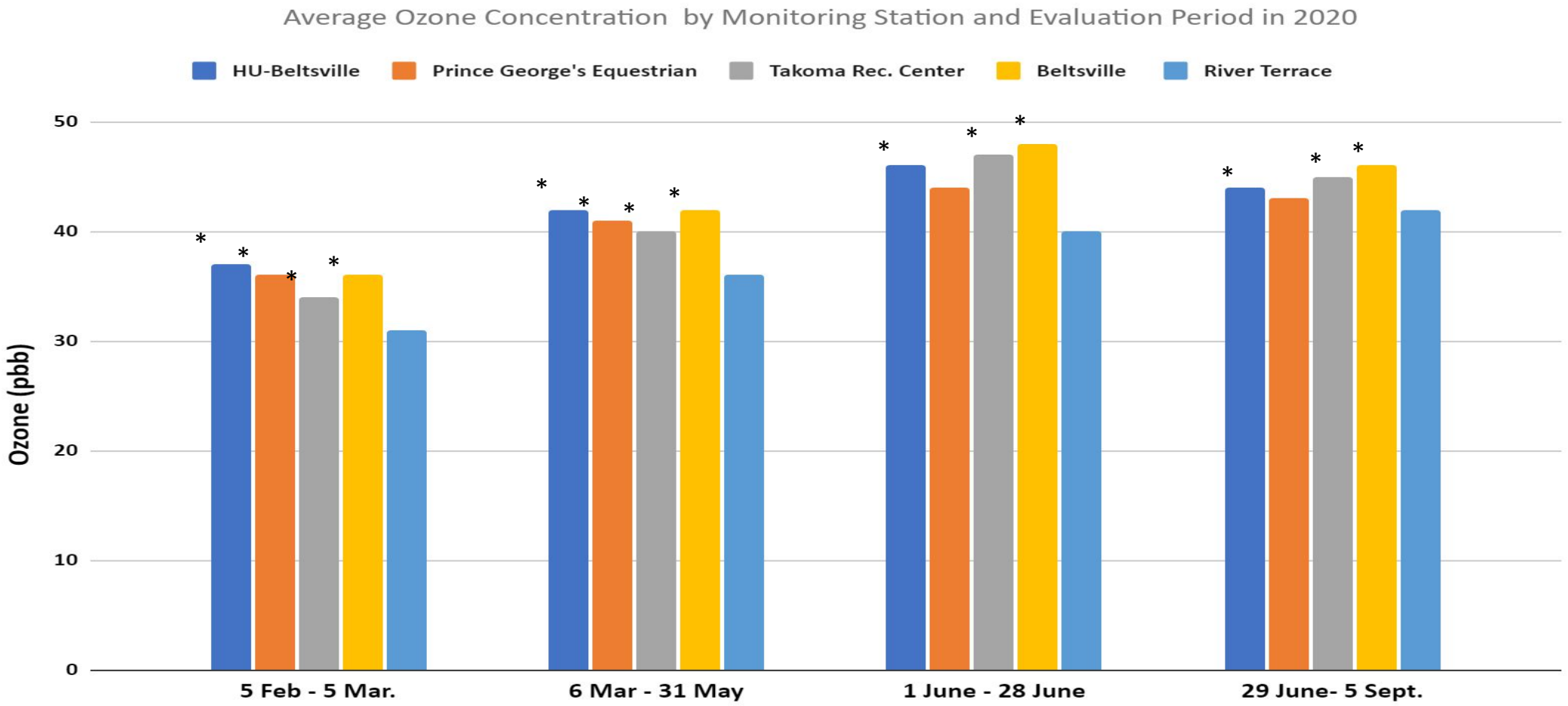
Findings: Pollutant Concentrations



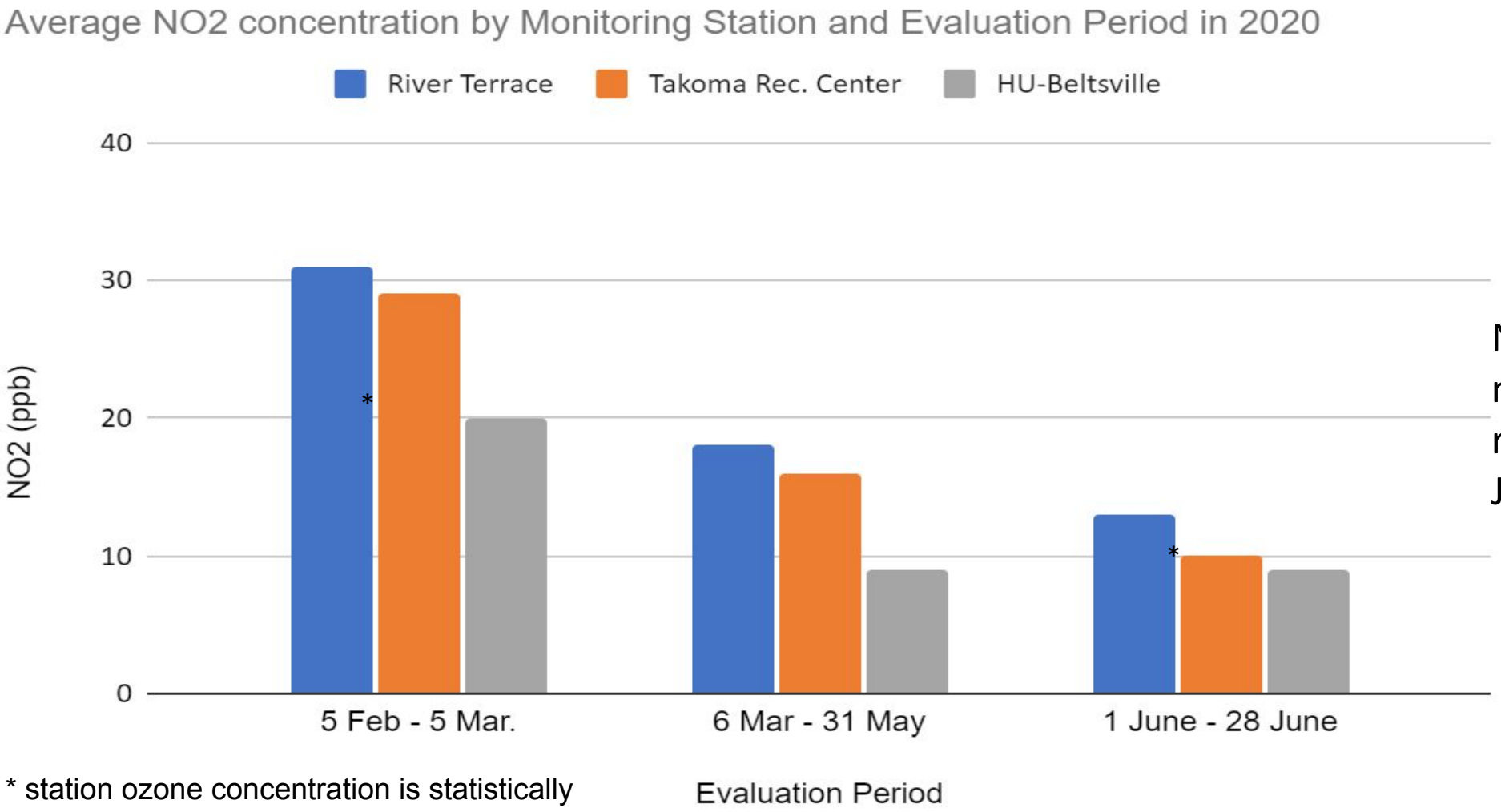








* station ozone concentration is statistically different than River Terrace at the P< 0.01 level



Note:
no data was recorded between June 29 and Sep 5

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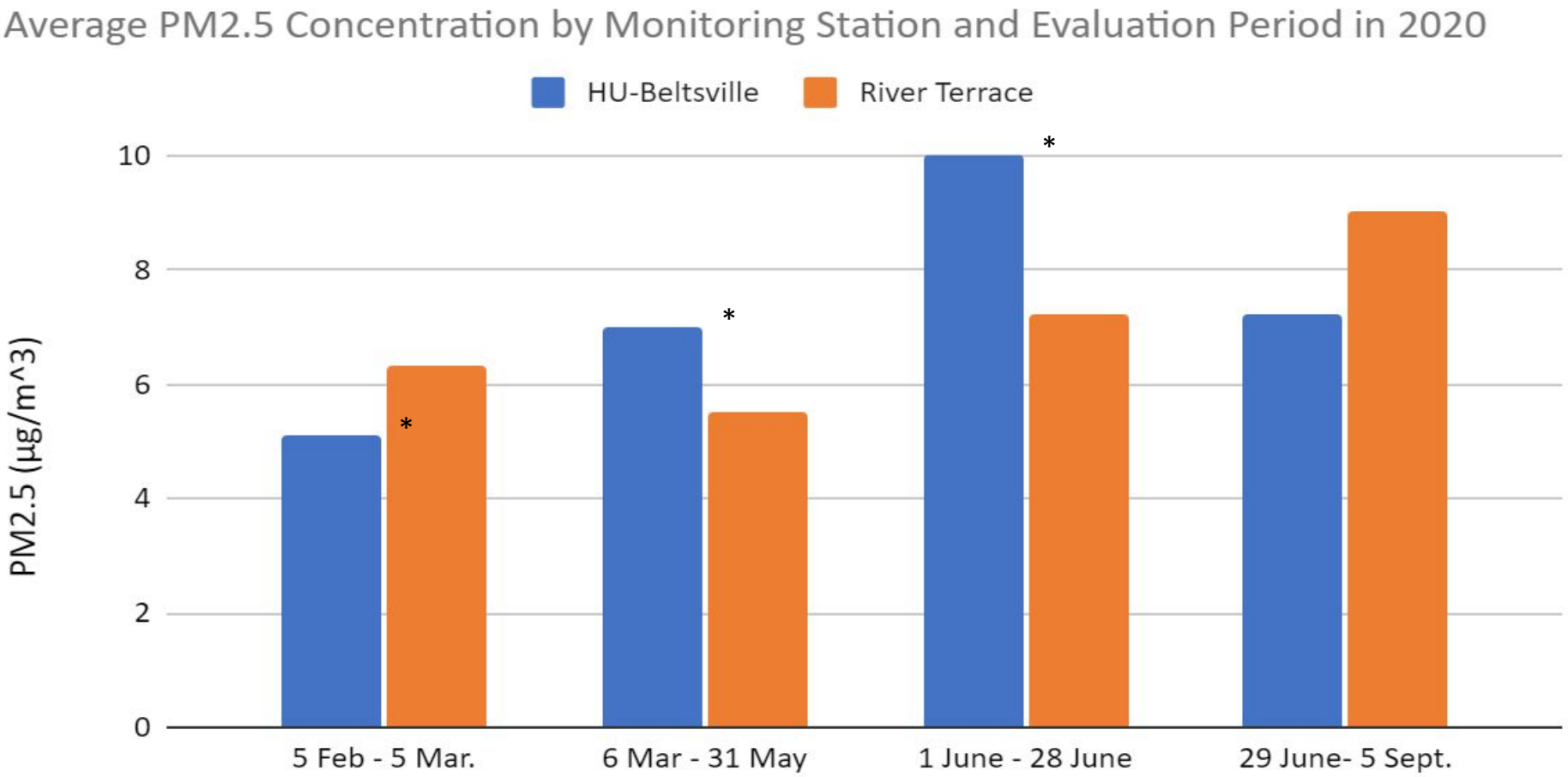

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Findings: Equity Emphasis Areas

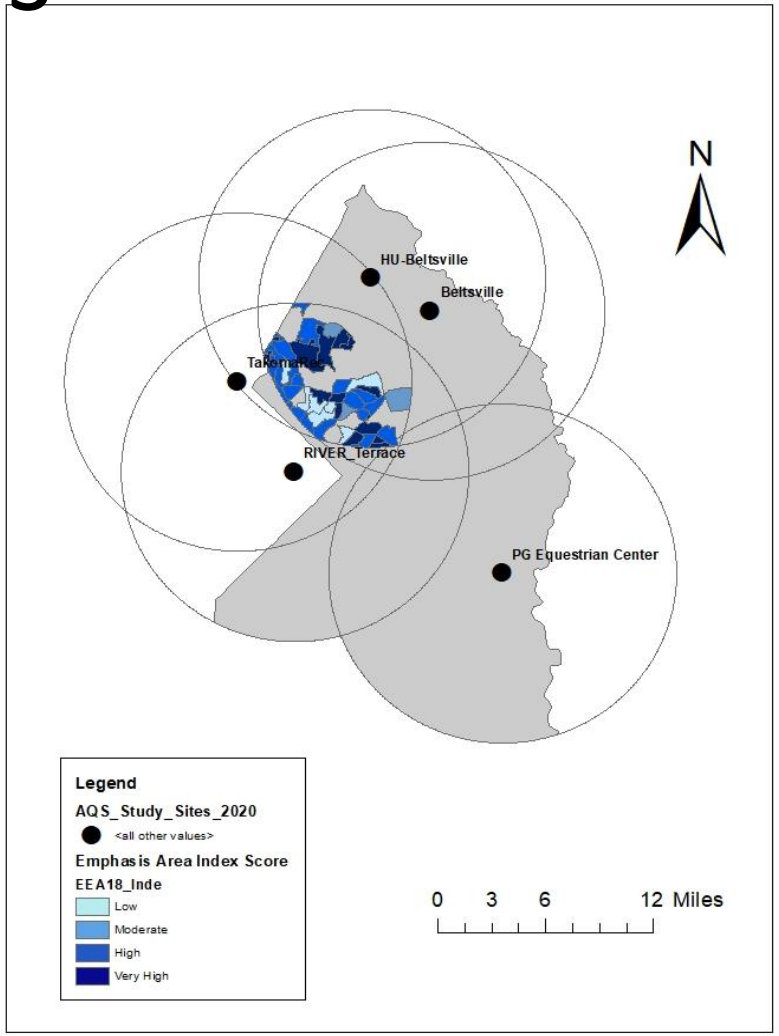
103 Equity Emphasis Areas are within the Air Quality System monitor impact zones

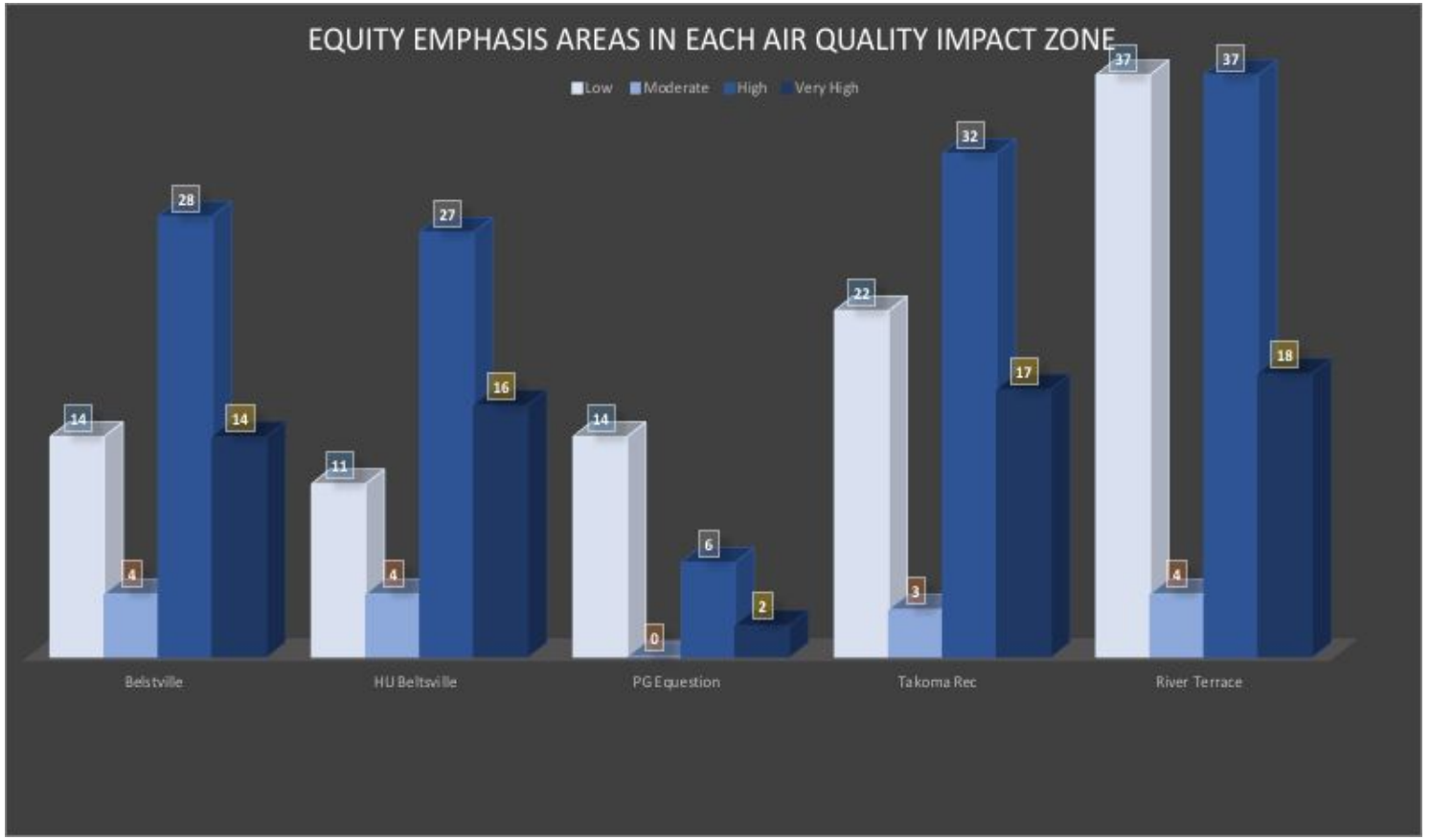
River Terrace air quality impacts 87% of the total Equity Emphasis Areas within the impact zones

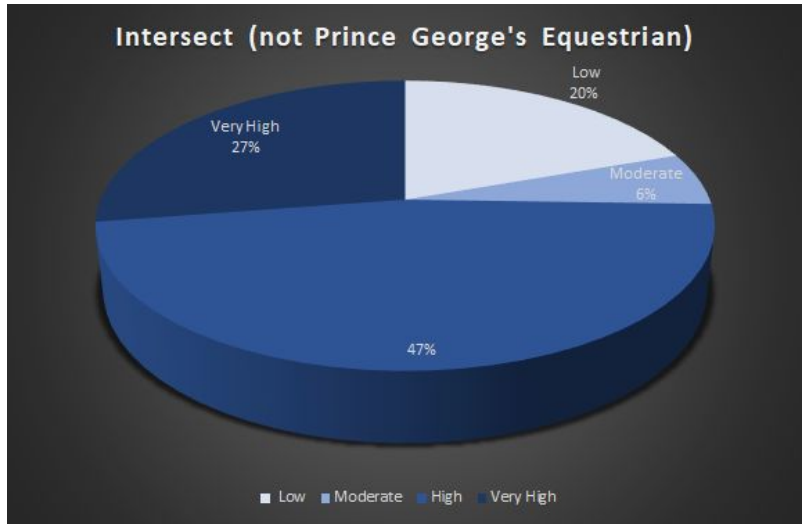
River Terrace has 18 Very High and 37 High ranking census tracts;

Four impact zones overlap in northwestern Prince George's County

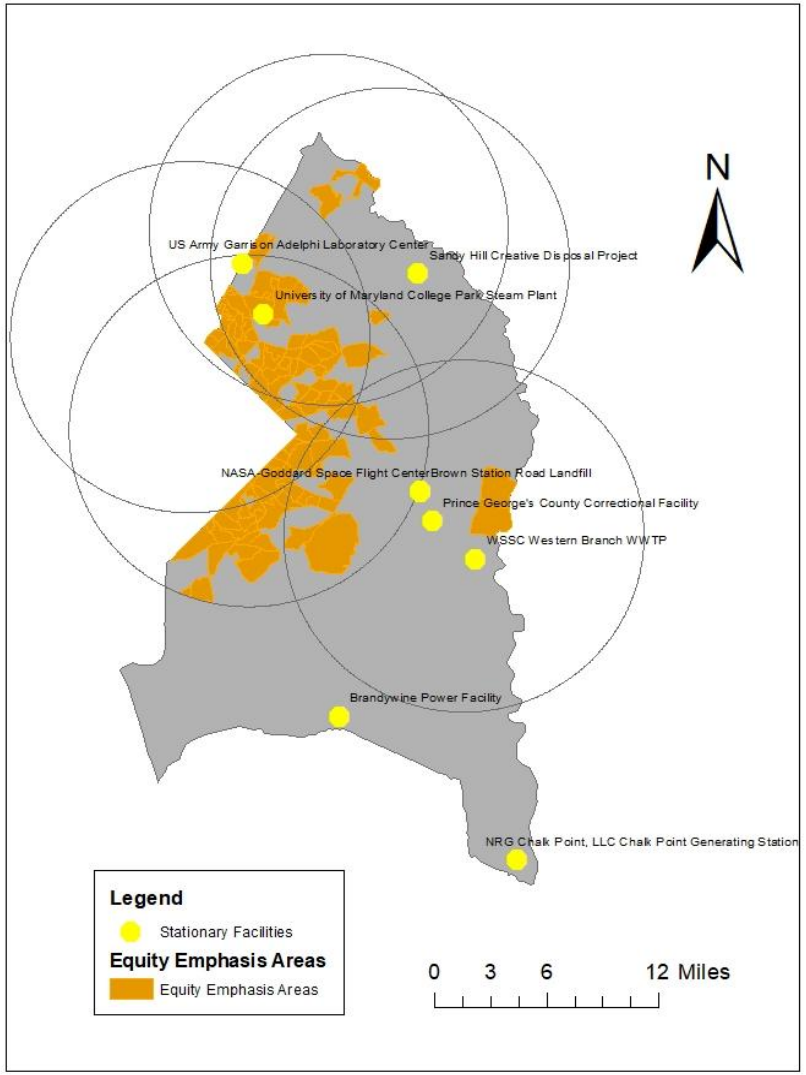
70% of the EEAs in the intersecting layer have total index scores 6.6 or greater




EQUITY EMPHASIS AREAS IN EACH AIR QUALITY IMPACT ZONE
Low
Moderate
High
Very High
14
4
28
14
11
4
27
16
14
0
6
2
22
3
32
17
37
4
37
18
Beltsville
HU Beltsville
PG Equestion
Takoma Rec
River Terrace


Intersect (not Prince George's Equestrian)
Low
20%
Very High
27%
Moderate
6%
47%
Low
Moderate
High
Very High

Air quality monitoring Station	EEA Area within monitoring station exposure area	Monitoring station's portion of county's toxic air emitting facilities
	%	
River Terrace	87	22
HU- Beltsville	41	33
Prince George's Equestrian	29	44
Takoma Rec	50	22
Beltsville	48	33



Air quality monitoring Station	EEA Area within monitoring station exposure area	Monitoring station's portion of county's toxic air emitting facilities
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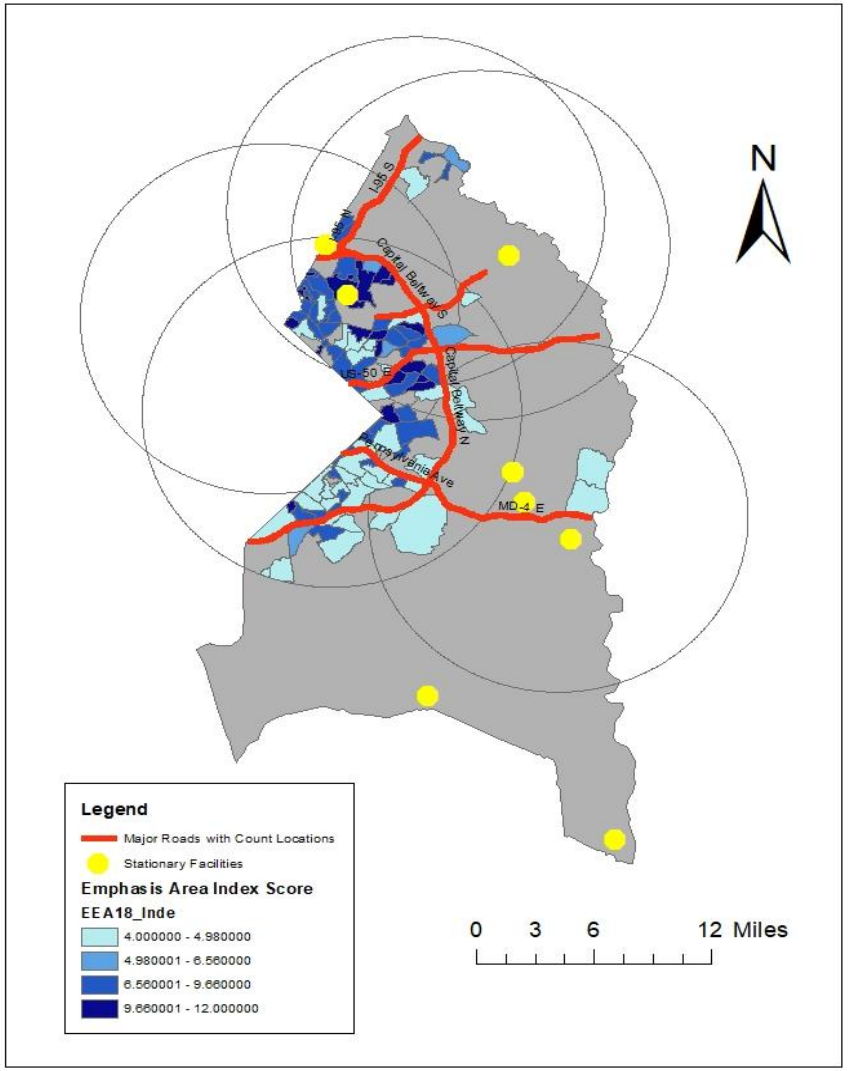


Findings: Stationary Emissions

Nine stationary sources report to EPA as Title V polluters

Two industrial facilities in the County are not in Air Quality Impact zones

All high traffic volume roads pass through Equity Emphasis Areas in the River Terrace impact zone

Locations where AQS impact zones overlap include the two stationary sources and I-95

Health and Environmental Justice

Minority and low-income populations suffer negative health effects disproportionately due to their proximity to high pollution areas

Prince George's County's Equity Emphasis Areas are proximate

General potential health effects studied:

- Cancer, heart disease and stroke, and respiratory disease
- Sorted by race
- Compared to other Maryland counties

Most indicators are within green "safe" zone, except stroke, high blood pressure, and adults with asthma

Health: Cancer

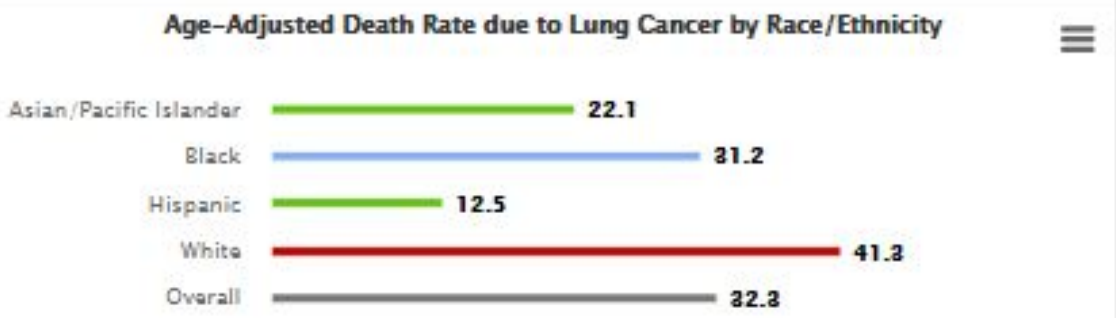
County: Prince George's

Age-Adjusted Death Rate due to Lung Cancer

32.3
Deaths per 100,000 population
(2013-2017)

Compared to:

MD Counties

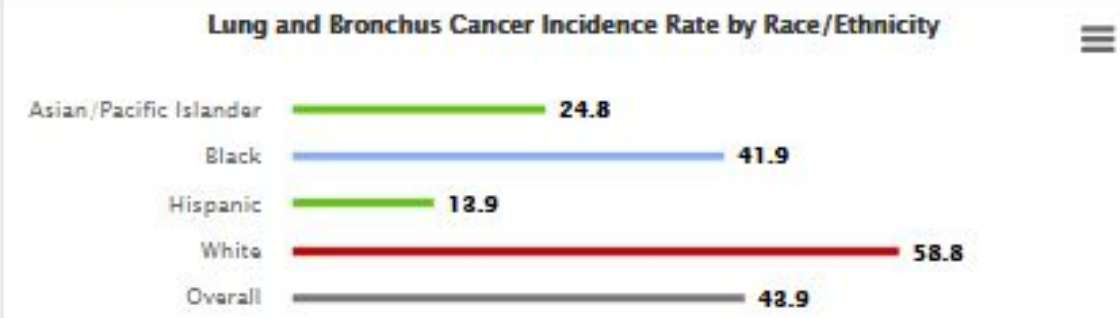


Lung and Bronchus Cancer Incidence Rate

43.9
Cases per 100,000 population
(2013-2017)

Compared to:

MD Counties



Health: Heart Disease and Stroke

County: Prince George's

Age-Adjusted Death Rate due to Cerebrovascular Disease (Stroke)

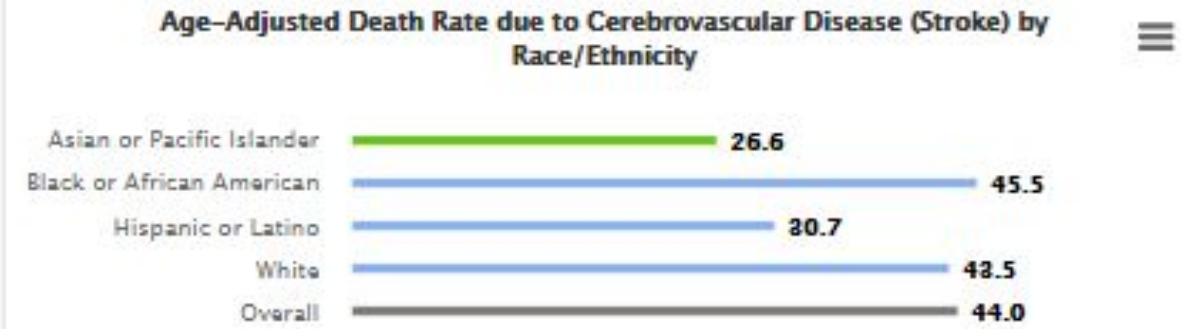
44.0

Deaths per 100,000 population

(2016-2018)

Compared to:

MD Counties



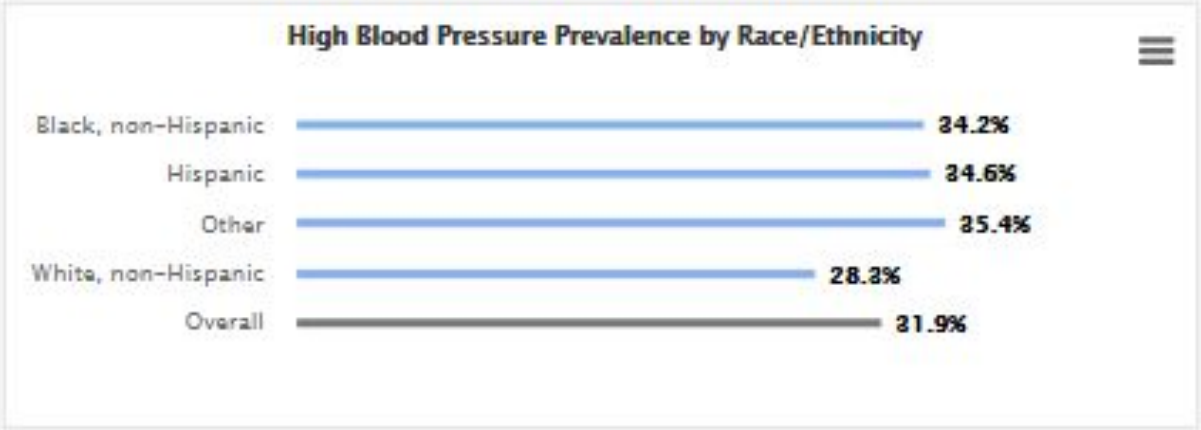
High Blood Pressure Prevalence

31.9%

(2017)

Compared to:

MD Counties



Learn More Save Card

Health: Respiratory Diseases

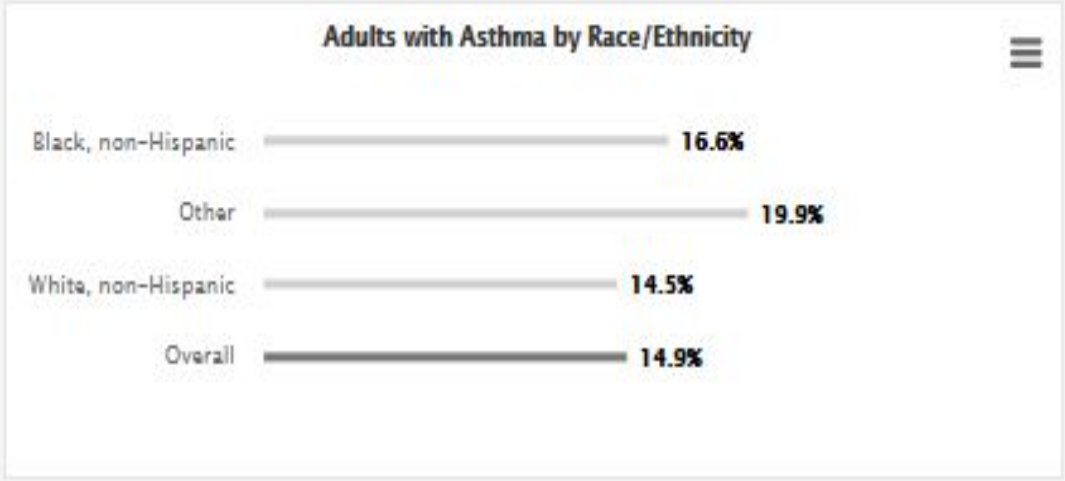
County: Prince George's

Adults with Asthma

14.9%
(2018)

Compared to:

MD Counties

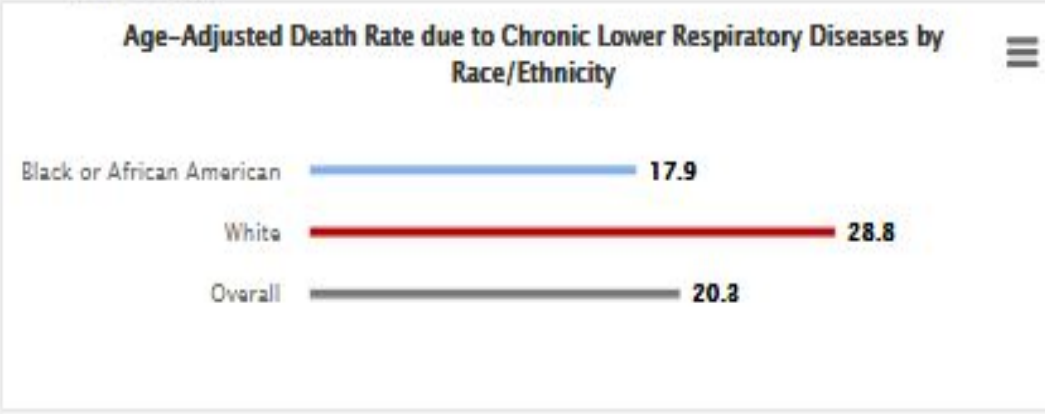


Age-Adjusted Death Rate due to Chronic Lower Respiratory Diseases

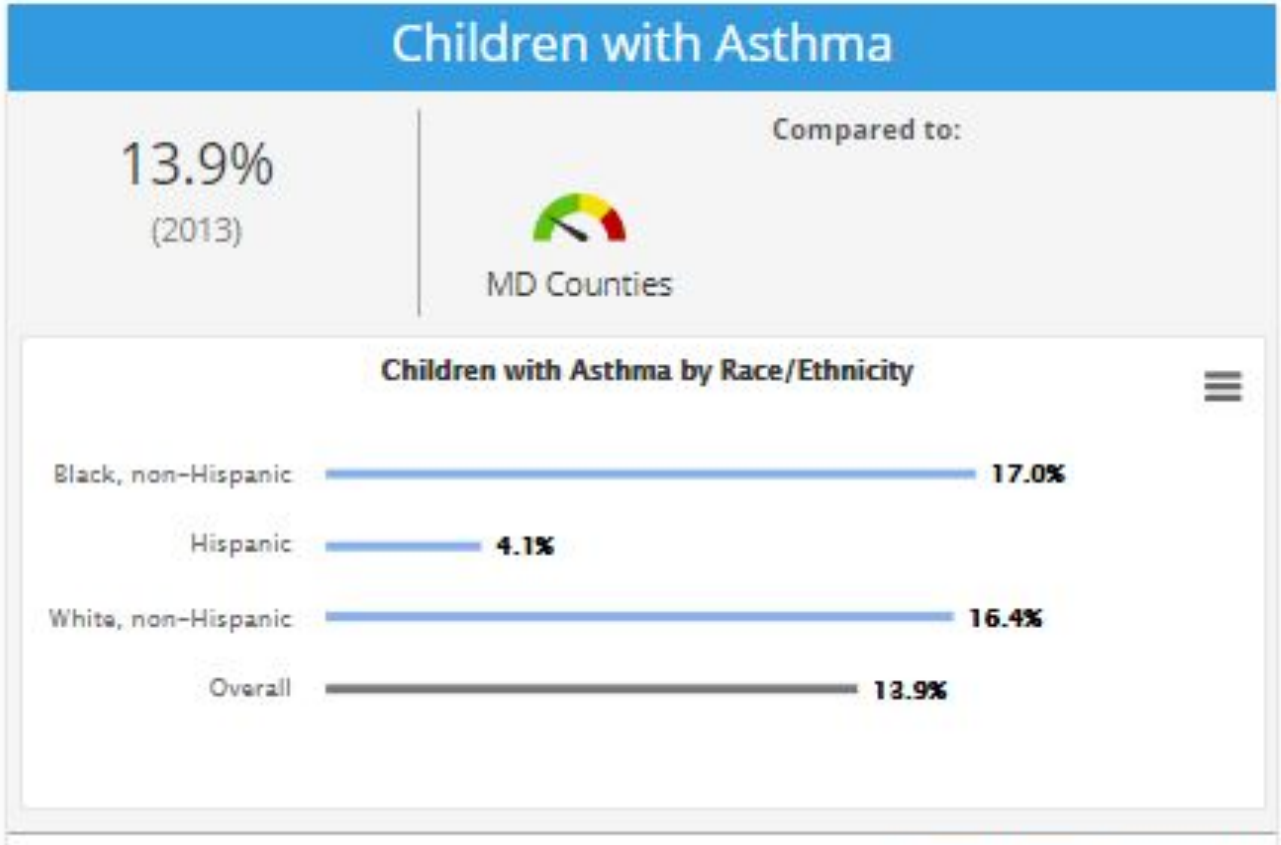
20.3
Deaths per 100,000 population
(2016-2018)

Compared to:

MD Counties



Health: Respiratory Diseases



Policy Considerations

Hard vs soft

- Hard policies: actionable, physical changes, typically infrastructure, land use, or roads, e.g., public transport, urban planning, road construction
- Soft policies: focused on voluntary programs, education, and outreach, e.g., car-sharing, eco-driving, and information campaign

Efficacy

- Evidence in favor of hard policies such as area road pricing, low emission zones, car-share, bike-share, and improved transit systems
- Road pricing, lower speed limits, and eco-driving
- Soft policies are an important parallel track, easy to implement

Policy Considerations: Case Studies and Equity

Worldwide

- London: congestion charge zone (CCZ) and low-emission zone (LEZ)
- Milan: road pricing

United States

- California: vehicle incentives for electric vehicles to low-income households
- California and Maryland: Low-Income Housing Tax Credits to transit-accessible areas

Equity

- Poverty and reliance on public transport: underfunded
- Policies that integrate and prioritize low-income and minority communities
  - reduce air pollution
  - collect data on affected communities
  - institute public participation

Policy Considerations: Case Studies and Equity

Maryland

- Rockville: employee telecommuting, subsidies for public or alternative transportation, bike-to-work programs, alternative fuel source fleet vehicles
- Havre de Grace: e-vehicle fleet and charging stations
- Montgomery County: Master Bicycle Plan

Prince George's County

- Hyattsville: transportation study on walking/biking needs, E-vehicle fleet, anti-idling, Capital bikeshare program

Policy Considerations

Transportation is the fastest growing source of CO2 in the US

Car emissions account for ⅓ of Maryland's CO2 emissions

Consider expanded financial incentives for using alternative transportation modes, e.g., clean commute tax credit is only available to employers

Focus on reducing total cars on the road

Expand tax credit for purchase of hybrid or electric vehicles

Consider financial incentives that don't replace one car with another or that adds cars

Policy Considerations

Multiple levels of government, multiple localities:

- shared burden of air pollution, shared highways
- wind
- can be more effective

Consider equity:

- public transportation
- soft and hard policies

Conclusions: Air Quality Trends

Ozone and NO2 clearly lower during 2020 pandemic periods

River Terrace NO2 and PM2.5 higher than other stations

All differences minimal; Air Quality Index always “Good”

Conclusion: Equity Emphasis Areas

87% of all Equity Emphasis Areas are within the River Terrace 12-mile radius

All major highways and interstates cross the River Terrace 12-mile radius

The overlapping impact zones are very high ranking and should be the focus of new policy considerations

Key Points

Ozone and NO2 lower than past years (loose correlation with reduced traffic)

River Terrace: higher NO2 and PM2.5

Highly disadvantaged EEAs fall into 4 of the 5 Air Quality Station impact zones

Stations most relevant to county EEAs outside the county

Sustainability and environmental justice policies require cooperation between localities and varying government levels

Policies must consider impacts on EEA communities and incorporate affected populations into decision-making

Limitations

Weather not considered

Few air quality monitoring stations

Pollutant data availability

Traffic data availability

Areas of Further Study

Weather modeling

Industrial facility emissions type/concentration

Direct health effects of poor air quality

Examination of neighboring localities